A #2

3.2 Check and Reflect

Key Concept Review

1. What trigonometric ratios can be used to determine the x or horizontal component of a vector? Draw diagrams to illustrate your answers.

[2] 2. Are the following statements true or false? Justify your answer.
   (a) The order in which vectors are added is important.
   (b) Displacement and distance are always equal.

3. Find d_x and d_y for the following vectors:
   (a) A boat travelling at 15 km/h [45° N of W]
   (b) A plane flying at 200 km/h [25° E of S]
   (c) A mountain bike travelling at 10 km/h [N]

[6] 4. Find the magnitude and direction of the vectors with the following components.
   (a) $d_x = 12$ m, $d_y = 7$ m
   (b) $v_x = 40$ km/h, $v_y = 55$ km/h
   (c) $d_x = 30$ cm, $d_y = -10$ cm

Connect Your Understanding

5. A student has created a short computer program that calculates components of vectors drawn with a computer mouse. To demonstrate his program, he drags the mouse to create a vector at 55 cm [30° W of S]. What are the components of the vector?

[9] 6. Determine the distance travelled and the displacement for each of the following.
   (a) In-line skating through a park takes you 5.0 km [W], 3.0 km [N], 2.0 km [E], and 1.5 km [S].
   (b) A swimmer travels in a northerly direction across a 500-m-wide lake. Once across, the swimmer notices that she is 150 m east of her original starting position.
   (c) After leaving her cabin, a camper snowshoes 750 m [N] and then 2.20 km [S].

[5] 7. A boat sails 5.0 km [45° W of N]. It then changes direction and sails 7.0 km [45° S of E]. Where does the boat end up with reference to its starting point?

[4] 8. How much time can you save travelling diagonally instead of running 450 m [S] and then 650 m [W] if your running speed is 5.0 m/s?

[2] 9. A pellet gun fires a pellet with a velocity of 355 m/s at an angle of 30° to the horizontal. What is the magnitude of the vertical component of the velocity at the moment the pellet is fired?

10. Tourists on a jet ski move 1.20 km [55° N of E] and then 3.15 km [70° S of E]. Determine the jet ski's displacement.

Question 10

11. A jogger runs with a velocity of 6.0 km/h [25° N of W] for 35 min and then changes direction, jogging for 20 min at 4.5 km/h [65° E of N]. Using a vector diagram, determine the jogger's total displacement and his average velocity for the workout.

12. Given that a baseball diamond is a square, assume that the first-base line is the horizontal axis. On second base, a baseball player's displacement from home plate is 38 m [45°].
   (a) What are the components of the player's displacement from home plate?
   (b) Has the runner standing on second base travelled a distance of 38 m? Why or why not?

13. Determine the resultant displacement of a skateboarder who rolls 45.0 m [310°] and 35.0 m [135°].

Reflection

14. Describe three examples of two dimensional motion you have experienced or observed.

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